Super-Ultra Small Industrial Video Borescope

Product catalog

Authorized Dealer

SPI ENGINEERING
— Simple, Precision and Innovation —



No need to disassemble, damage or cut.

Any scratches, spots of dirt and small holes can't escape from this.

SPI ENGINEERING
— Simple, Precision and Innovation —

As long as there is an invisible place
Our challenge continues.



Simplicity is the ultimate sophistication

[Simple]

Our commitment is to deliver simple solution with competitive features while keeping cost as affordable as possible.

[Precision]

Our commitment is to deliver valuable solution to those who require precise work as precision instrument.

[Innovation]

Our commitment is to bring innovation into industry and customers through our products.

SPI ENGINEERING Co.,Ltd.

CEO : HARAYAMA KOICHIRO

Company Profile

Company Name	SPI Engineering Co.,Ltd.
Address	2592-5, Inaba-Minamimata, Nagano City, Nagano, JAPAN 380-0917
Date of Establishment	2006. July.13
Capital	9,990,000yen
Employees	10
Business Outline	Manufacturing and sales of electronic, precision, and medical products including R&D related to these products.
Representative Director	CEO : HARAYAMA　KOICHIRO

SPI ENGINEERING
— Simple, Precision and Innovation —

Our Main Customers

[Automotive]	TOYOTA, HONDA, NISSAN, DAIHATSU, SUBARU, SUZUKI
[Manufacturing]	SONY, PANASONIC, HITACHI, RICOH, KOMATSU
[Heavy Industry]	MITSUBISHI, KOBELCO
[Railway]	JR (JAPAN RAILWAYS)
[Telco]	NTT(Japanese telecommunications company)
[Aerospace parts]	JAXA

Offices（Distributor with exclusive sales rights in the area）

Area	Company Name
Korea	Kyung-hws Tools&Machinery Co.,Ltd.
Taiwan	QTS Corporation
Thailand	UNO Machinery Thailand
Chaina	深圳高精達精密工具有限公司
Malaysia	Accurate Technology & Services Sdn. Bhd. SANKYO MACHINE TOOLS（MALAYSIA）SDN.BHD.
India	Godrej & Boyce Mfg Co Ltd. / Precision Products Marketing
Philippines	MESCO INC.
Denmark	Dana Tool A/S
France	AMBPR
Netherlands / Belgium / Luxembourg	Opticon Benelux Naarden B. V.
Italy	TECNIMETAL SRL
Czech Republic	Three, s.r.o.

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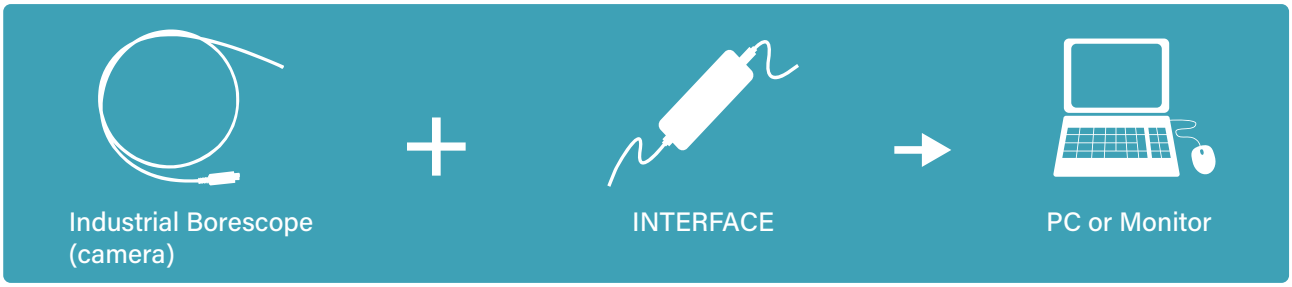
About Industrial Borescope

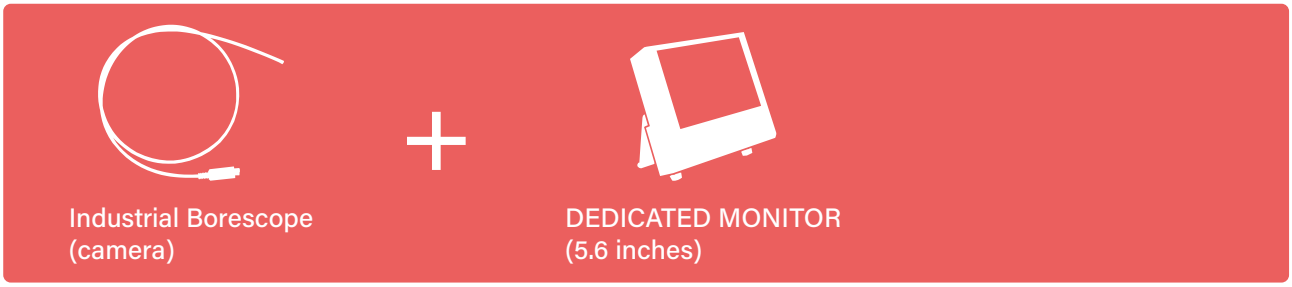


Features

The SPI ENGINEERING Video Borescopes has CMOS sensor at the tip of the probe.
You can see inside the holes that you cannot see, and you can use it to inspect your product or equipment.

Please use as a set with INTERFACE or DEDICATED MONITOR





(Note) SPI Engineering sells products only to corporate customers and rents demo machines.
Please note that we do not do business with general (individual) customers.

HNL-0.5CAM80S

Diameter **0.5mm**

9,000 pixels
(Number of fibers)

This fiberscope has a tip diameter of 0.5mm.
It contains 9,000 built-in image fibers,
delivering high image quality despite its 0.5mm diameter.
It also features light adjustment and edge enhancement functions.



9000 pixels
(Number of fibers)

with light source
dimmable

Equipped with
edge enhancement function

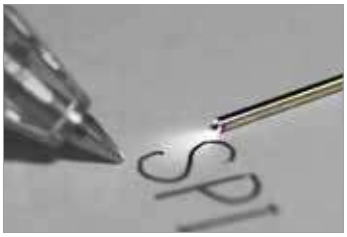
Your PC
(USB input)

HNL-0.98CAM120SQ

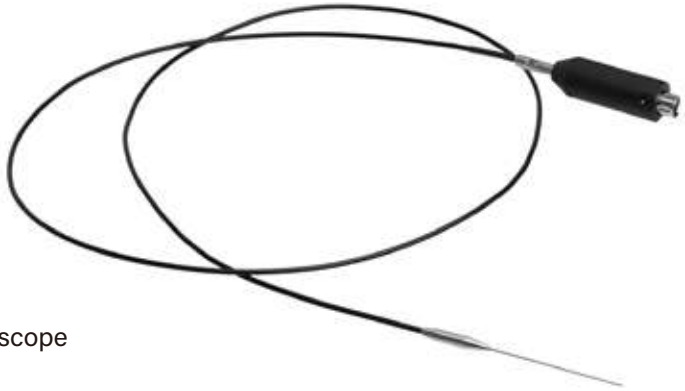
Diameter **0.98mm**

160,000 pixels

This is an industrial borescope with a tip diameter of 0.98 mm. It ranks among the thinnest industrial borescopes in the world that utilize an image sensor rather than fiber optics.



← Ballpoint pen and Borescope



160,000 pixels

with light source
dimmable

Dedicated Monitor
HKT-5.6SA II α

Your PC
(USB input)

Your Monitor
(HDMI input)

Side Mirror Attachments available

HNL-1.3CAM120(S)

Diameter **1.3mm**

160,000 pixels

This Industrial borescope has a tip diameter of 1.3 mm.
It can inspect small holes that were previously impossible to insert with conventional products.
You can choose from two types: pen type and flexible type.(The rigid tip (Φ1.3 mm) of both types does not bend.)



HNL-1.3CAM120 (Pen Type)
Ideal for mounting on robots, jigs, etc.



HNL-1.3CAM120S (flexible type)
Ideal for manual work.

160,000 pixels

with light source
dimmable

Dedicated Monitor
HKT-5.6SA II α

Your PC
(USB input)

Your Monitor
(HDMI input)

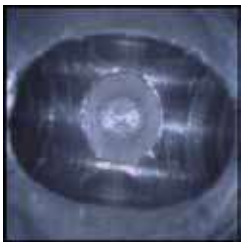
Side Mirror Attachments available

HNL-1.8CAM120

Diameter **1.8mm**

160,000 pixels

This is a best-selling product. Although this camera is extremely small, with a tip diameter of φ1.8mm,its 400 x 400 pixels make it useful for inspecting previously difficult-to-detect foreign objects, scratches,burrs, and other objects. It's extremely easy to use, and images can be viewed on a variety of media, including a dedicated monitor, PC, and TV (monitor).



← Image captured with HNL-1.8CAM120
(φ2.3 cross-hole)



160,000 pixels | with light source dimmable | Dedicated Monitor HKT-5.6SA II α | Your PC (USB input) | Your Monitor (HDMI input) | Side Mirror Attachments available

HNL-1.8CAM120SQ

Diameter **1.8mm**

510,000 pixels

The best-selling model "HNL-1.8CAM120" has been improved.
This product is ultra-thin, measuring just 1.8mm in diameter,
but its resolution has been significantly improved from
400x400 to 720x720 pixels.
When inspecting tight spaces and fine details,
it now offers clearer and
more detailed images than ever before.



510,000 pixels | with light source dimmable | Dedicated Monitor HKT-5.6SA II α | Your PC (USB input) | Your Monitor (HDMI input) | Side Mirror Attachments available

HNL-1.8CAM120ST

Diameter **1.8mm**

160,000 pixels

The best-selling model "HNL-1.8CAM120" has been improved.
The HNL-1.8CAM120ST features a rigid pipe design that
prevents the tip from bending.
Compared to the HNL-1.8CAM120, which has the same diameter,
the LED at the tip is six times brighter,
and The HNL-1.8CAM120ST is stronger.



160,000 pixels | with light source dimmable | Dedicated Monitor HKT-5.6SA II α | Your PC (USB input) | Your Monitor (HDMI input) | Side Mirror Attachments available

HNL-2.3CAM120K

Diameter **2.3mm**

160,000 pixels



This is an ultra-slim industrial borescope with a diameter of 2.3 mm. It features a "snake camera" design with a short rigid tip section. Compared to other borescopes, it excels at insertion into curved workpieces.

160,000 pixels | with light source dimmable | Easy to insert ※ into curved sections | Dedicated Monitor HKT-5.6SA II α | Your PC (USB input) | Your Monitor (HDMI input)

※・・・[Caution] Please avoid sharp bends with a radius of 30 mm or less.
Insertion of the borescope may not be possible if there are right-angle bends inside the workpiece or irregularities on the surface.

HNL-1.8CAM120ATT

Diameter **2.5mm**

160,000 pixels



The HNL-1.8CAM120ATT was developed based on feedback from high-frequency usage environments where endoscopes are repeatedly inserted and removed multiple times a day. Unlike other endoscopes, it allows for the attachment of a "protective pipe" to safeguard the tip of the endoscope.

160,000 pixels | with light source dimmable | Dedicated Monitor HKT-5.6SA II α | Your PC (USB input) | Your Monitor (HDMI input)



Detachable
Recommended for heavy use

HNL-2.9CAM Series

Diameter **2.9mm**

160,000 pixels



This is a long-selling product. Tip diameter is 2.9mm.
It features a narrower field of view than other Borescopes.
You can choose the focal length and tube type.

160,000 pixels | with light source dimmable | Borescope tip Sapphire glass | The angle of view is narrow | Dedicated Monitor HKT-5.6SA II α | Your PC (USB input) | Your Monitor (HDMI input)

Side Mirror Attachments available



Focal Length

The HNL-2.9CAM series has two models, one that focuses on close objects (N) and one that focuses on far objects (F), allowing you to select the camera with the optimal focus for your work.

Tube Variations

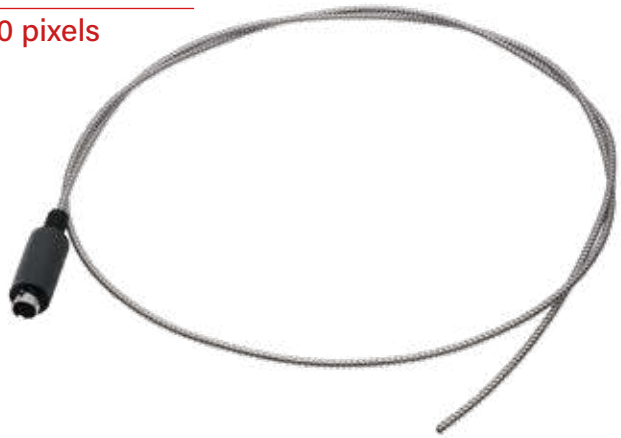
In addition to the standard tube, two other variations are available, allowing you to select the camera tube material based on your operating environment. Both types offer superior wear resistance compared to the standard tube. The H-type is capable of maintaining its tubular shape.

HNL-2.9CAM120K

Diameter **2.9mm**

160,000 pixels

The short rigid tip makes it easier to insert into curved objects compared to other borescope cameras. In addition, the light source at the tip of the camera is equipped with an optical fiber light guide, achieving brighter illumination than our HNL2.9CAM Series with the same diameter.



160,000 pixels

with light source dimmable

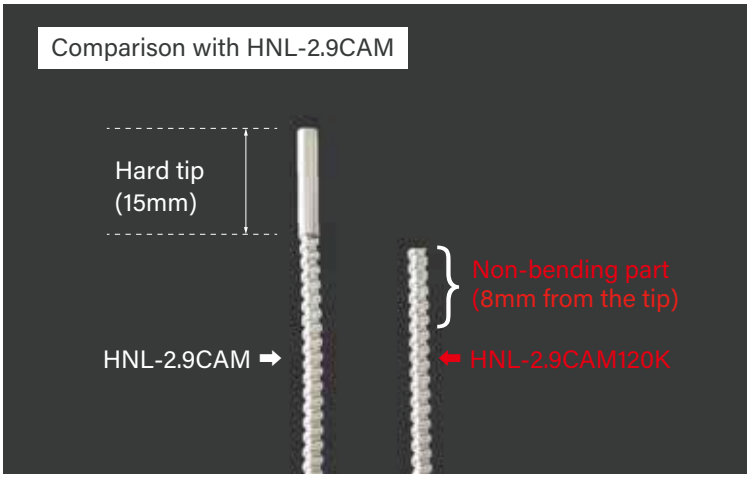
Easy to insert ※ into curved sections

Dedicated Monitor HKT-5.6SA II α

Your PC (USB input)

Your Monitor (HDMI input)

Side Mirror Attachments available



Snake Camera Protector

Protects the tip of the camera.
Particularly recommended if the endoscope is used frequently and the tip is prone to wear.

Model number	HNL-2.9PT
Outer diameter	ϕ3.3mm×L5.5mm





※･･･[Caution] Please avoid sharp bends with a radius of 30 mm or less.
Insertion of the borescope may not be possible if there are right-angle bends inside the workpiece or irregularities on the surface.

HNL-2.9CAM120KSQ

Diameter **2.9mm**

510,000 pixels

The above-mentioned model, the "HNL-2.9CAM120," has been further improved. This product is ultra-thin, measuring just 2.9mm in diameter, but its resolution has been significantly improved from 400x400 to 720x720 pixels. When inspecting tight spaces and fine details, clearer and more detailed images than ever before are now possible. The same protectors and attachments as the above-mentioned model, the "HNL-2.9CAM120," can be used.



510,000 pixels

with light source dimmable

Easy to insert ※ into curved sections

Dedicated Monitor HKT-5.6SA II α

Your PC (USB input)

Your Monitor (HDMI input)

Side Mirror Attachments available

※･･･[Caution] Please avoid sharp bends with a radius of 30 mm or less.
Insertion of the borescope may not be possible if there are right-angle bends inside the workpiece or irregularities on the surface.

SDV-4.0CAM120T(H)

Diameter **4.0mm**

160,000 pixels

Most conventional industrial endoscopes are designed to display images from the front.
While a side-view attachment allows for lateral viewing, cameras with a wide field of view narrow the visible range, posing an issue of insufficient visibility.
The SDV-4.0CAM120T(H) is a dedicated side-view model with the camera itself positioned sideways.
It can capture clear images directly to the side of the insertion direction without relying on an attachment.
It enables reliable, high-precision inspections without sacrificing visibility.



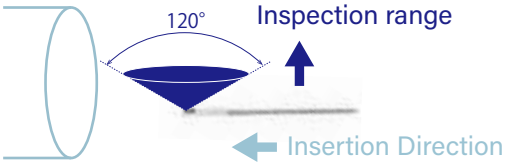
SDV-4.0CAM120T
Rigid pipe specifications
(Cannot be bent)



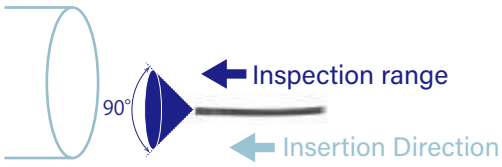
SDV-4.0CAM120TH
Shape retention specifications
(Flexible)

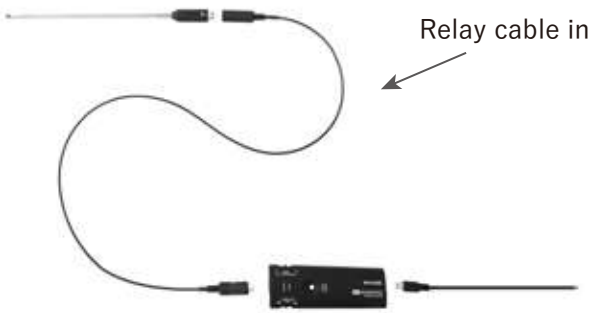
Camera specifications

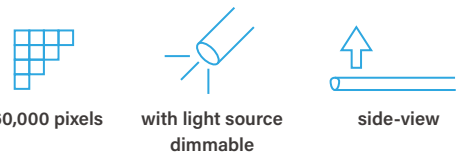
Side view camera SDV-4.0CAM120T(H)
Viewing angle 120 degrees



HNL-4.6 CAM90N(Conventional product)
viewing angle 90 degrees





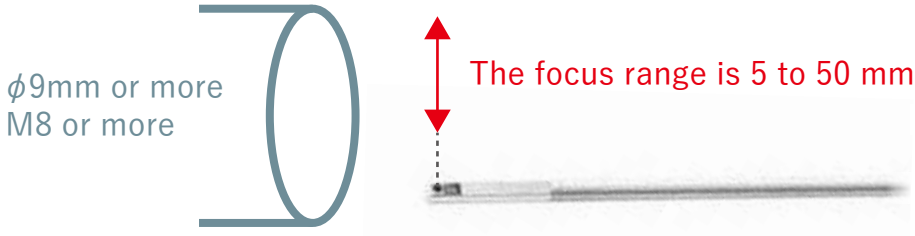


160,000 pixels | with light source dimmable | side-view



Dedicated Monitor HKT-5.6SA II α | Your PC (USB input) | Your Monitor (HDMI input)

The Side View Camera SDV-4.0CAM120T(H) can be used with holes of Φ9mm or larger and M8 or larger.
If the insertion hole is too large or small, a clear image will not be obtained.



HNL-4.6 Series

Diameter **4.6mm**

80,000 pixels

This is a long-selling product. Tip diameter is 4.6mm.
Focal length and tube type are selectable.



80,000 pixels | with light source dimmable | Borescope tip Sapphire glass | Dedicated Monitor HKT-5.6SA II α

Side Mirror Attachments available

Depth of view

The HNL-4.6CAM series has two models, one that focuses on close objects (N) and one that focuses on far objects (F), allowing you to select the camera with the optimal focus for your work.

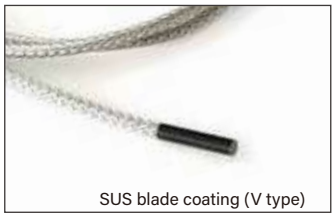
Model number	HNL-4.6 CAM90N	HNL-4.6 CAM90F
Angle of view	90°	90°
Depth of view	5mm～10mm	10mm～50mm

Tube Variations

There are two types of camera tubes: standard and V type (SUS braid coated), allowing you to select the material of the camera tube depending on the environment in which it will be used. The V type is more abrasion resistant than the standard tube.



Standard Tube



SUS blade coating (V type)

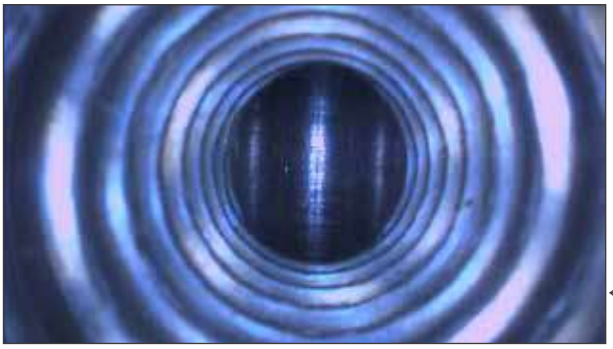
HNL-4.6HDC110SQ(TL)

Diameter **4.6mm**

1-megapixels

The high-definition borescope (HNL-4.6HDC series) is an industrial borescope that achieves 1 million pixels (720 vertical pixels, 1280 horizontal pixels) despite its narrow tip diameter of just 4.6 mm.
You can choose from two specifications: standard tube or tubeless, depending on the work you want to view. You can easily view the image on your PC, TV, etc.





←Image captured with HNL-4.6HDC110SQ (M6 cross hole)

1-megapixels | with light source dimmable | Your PC (USB input) | Your Monitor (HDMI input)

Side Mirror Attachments available

HNL-4.6HDC110SQST

Diameter **5.0mm**

1-megapixels



This high-definition borescope is a rigid, non-bending type with a tip protected by a sturdy pipe.
Compared to other borescopes, the pipe is thicker and more durable, making it recommended for use in situations where the pipe is prone to rubbing.

1-megapixels | with light source dimmable | Wear-resistant※ | Your PC (USB input) | Your Monitor (HDMI input)

※・・・Compared to the conventional product (HNL-4.6HDC110SQ)

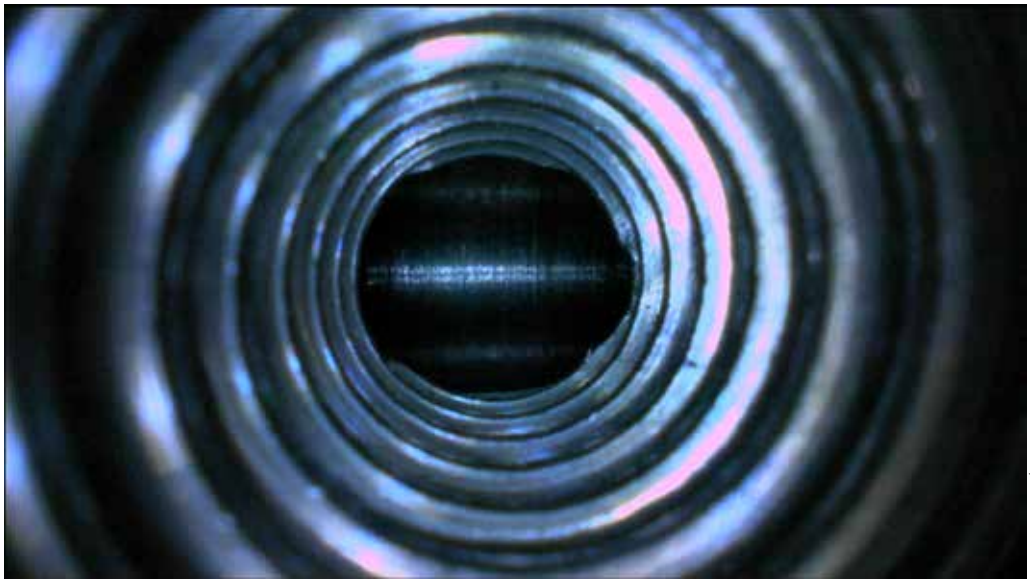
HNL-6.0HDC140SQ(H)

Diameter **6.0mm**

2-megapixels



The Full HD borescope (HNL-6.0HDC series) is an industrial borescope equipped with a 2-megapixel (1080 vertical pixels, 1920 horizontal pixels) CMOS image sensor. HD borescopes have approximately 12 tim es the number of pixels (compared to our company's previous models) of conventional borescopes, meaning that image grain is not noticeable even when enlarged or printed. Furthermore, the wide-angle lens makes it possible to observe the entire subject in detail while projecting it onto a large screen.



←Image captured with HNL-6.0HDC140SQ(H) (M8 cross hole)

Highest image quality across the entire product lineup

2-megapixels | with light source dimmable | Your PC (USB input) | Your Monitor (HDMI input)

Side Mirror Attachments available

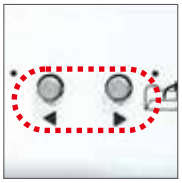
Borescope dedicated monitor　HKT-5.6SA II α

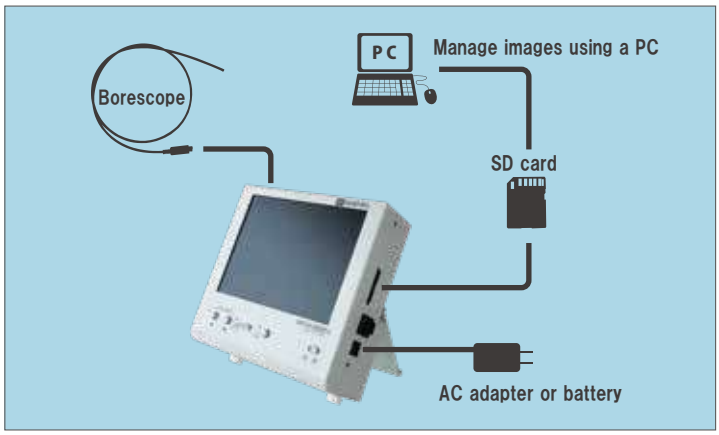
This is a dedicated monitor for Industrial Borescopes. It is compatible with all cameras except high-definition cameras. It comes standard with an image saving function, allowing you to save and review images immediately after using the borescope. Images are saved in JPEG format on an SD card, making them easy to manage on a computer. In addition to an AC adapter, it also comes equipped with a battery holder so it can be used outdoors or in places without electrical equipment.



Adjustable LED lights intensity

Intensity of White LEDs mounted on the tip of camera can be adjusted by switches on the monitor in 8 different levels of brightness.





Save images to external memory

In the same way as a typical digital camera, you can capture images by simply pressing a button, and these images are stored on the included memory media (JPEG format).



SD card

Tilting Desk-Top Mount

Angle of monitor screen can be easily adjustable according to your comfort and the stand can be stored to monitor when it is not in use.



Battery-powered

Portable monitor can be also operated by regular battery. HKT-5.6SA requires 4 C batteries.



The display can be switched by pressing the side button (supported only on HNL-1.8CAM120SQ and HNL-2.9CAM120KSQ).



Nomal view　　Enlarge view

Standard NTSC output (output to a TV) is now an optional feature. Please contact us before purchasing if you require this option.

AMCap for HKT-USB

When connecting an industrial borescope to a PC, the viewer software to be used.

USB Interface

HKT-USB TYPE X, HKT-USB TYPE WS, HKT-USB TYPE 2, HKT-USB TYPE XS

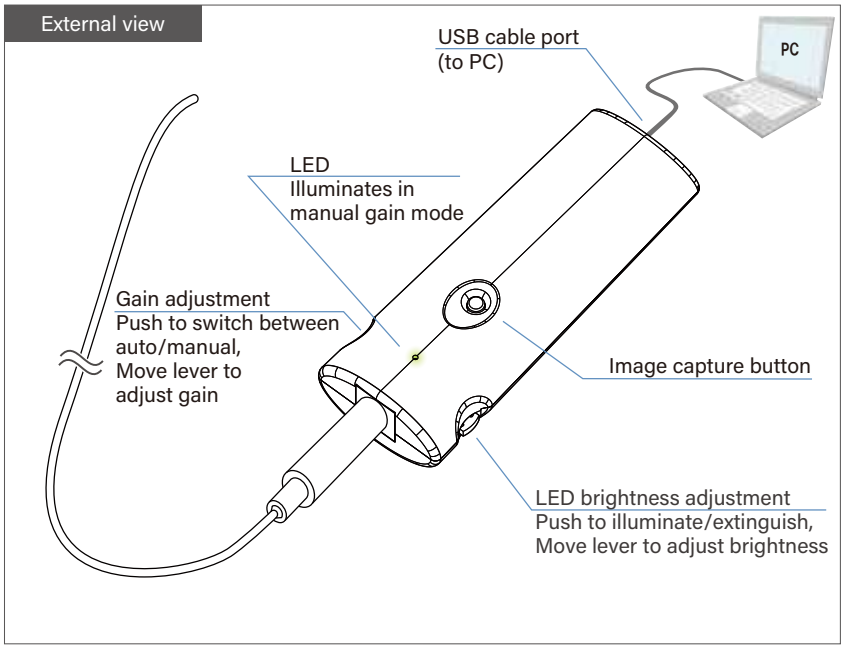
Detailed specifications(→P16)

Connect the Borescope camera to your PC
Equipped with image capture function
Equipped with LED lighting dimming function
Auto/manual gain switching
(Features available vary depending on the model)





External view



DVI Interface

HKT-DVI TYPE W II, HKT-DVI-720P, HKT-DVI-720P, HKT-DVI-480P

Detailed specifications(→P16)

Can be connected to your PC
Equipped with stop moving function
Equipped with LED lighting dimming function
Manual gain switching possible





HKT-DVI TypeWS Compatible Borescope
HNL-0.98CAM120SQ
HNL-1.3CAM120(S)
HNL-1.8CAM120(ST)
HNL-2.5CAM120
HNL-2.9CAM120K
HNL-4.0CAM120T(H)

HKT-DVI-720P Compatible Borescope
HNL-1.8CAM120SQ
HNL-2.9CAM120KSQ

HKT-DVI-480P Compatible Borescope
HNL-2.9CAM Series

USB / DVI Interface

HKT-DVI (for HNL-4.6HDC), HKT-DVI(for HNL-6.0HDC)

Detailed specifications(→P16)

Connect your HD Borecope camera to your PC or TV monitor.
Image saving function (only when connected to a PC).
LED lighting dimming function.
Auto/manual gain switching.



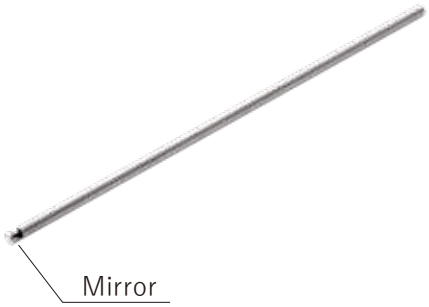
Compatible Borescope
HNL-4.6HDC110SQ(ST)
HNL-6.0HDC140SQ



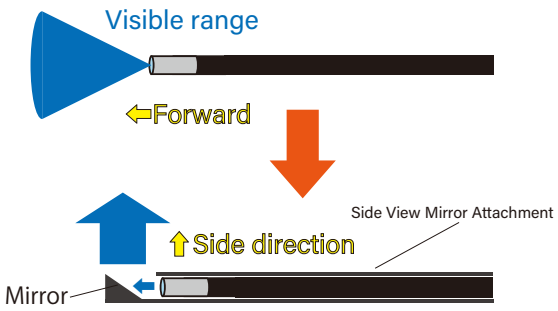


Side View Mirror Attachment

The presence or absence of each attachment differs depending on the model of the borescope.
Please check in advance if necessary.



The mirror at the end of the pipe allows you to see the side.



Standard products for HNL-2.9CAM and HNL-4.6CAM Comes with a handle.



We accept mirror replacement repair. ※1
Please contact us for details.

※1･･･Models are limited to ϕ2.9mm side view or ϕ4.6mm side view.

The model below is made of Sapphire Glass.
It is less susceptible to scratches than polished metal mirrors.

ϕ2.9mm side view attachment：HNL-2.9S9D-G
ϕ4.6mm side view attachment：HNL-4.6S9D-G



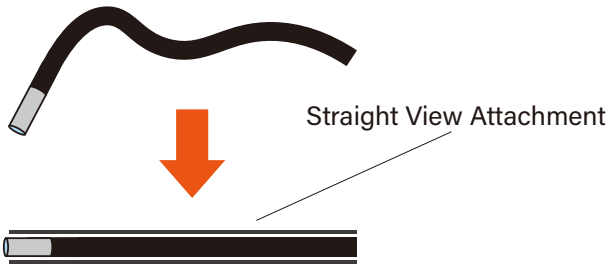
		Side View Mirror Attachment						
		For HNL-0.98CAM	For HNL-1.3CAM	For HNL-1.8CAM	For HNL-2.9CAM		For HNL-4.6CAM	For HNL-6.0HDC
		90° Side View	90° Side View	90° Side View	90° Side View	60° Side View	90° Side View	90° Side View
A		HNL-0.98SDV	HNL-1.3SDV	HNL-1.8SDV	HNL-2.9S9D-G	HNL-2.9S6D	HNL-4.6S9D-G	HNL-6.0SDV
B	Full length	40mm (MAX:95mm)	95mm	100mm (MAX:300mm)	200mm (MAX:500mm)		200mm (MAX:500mm)	200mm (MAX:500mm)
	Outer diameter	ϕ1.2mm	ϕ1.6mm	ϕ2.2mm	ϕ3.2mm		ϕ5.2mm	ϕ6.5mm

Straight view Attachment

The presence or absence of each attachment differs depending on the model of the borescope.
Please check in advance if necessary.



Holds the tube shape of the borescope.
Supports insertion into straight holes.



		Straight View Attachment			
		For HNL-1.8CAM	For HNL-2.9CAM	For HNL-4.6CAM	For HNL-6.0HDC
A		HNL-1.8STV	HNL-2.9STV	HNL-4.6STV	HNL-6.0STV
B	Full length	100mm (Max:300mm)	200mm (Max:500mm)		
	Outer diameter	ϕ2.2mm	ϕ3.2mm	ϕ5.2mm	ϕ6.5mm

ϕ0.98mm～ϕ2.3mm Industrial Borescope specification

HNL-1.8CAM120SQ

A B



A		HNL-0.5CAM	HNL-0.98CAM	HNL-1.3CAM120		HNL-1.8CAM			HNL-2.3CAM
B		80S	120SQ	120	120S	120	120SQ	120ST	120K
	Depth of field(mm)	3～7	3～30			5～50		3～30	3～30
	Angle of view(※2)	80°	120°						
	Outer diameter(mm)	ϕ0.5	ϕ0.98	ϕ1.3		ϕ1.8			ϕ2.3
	Light source	Fiber Optic Light Guide (with light modulation function)							
	Waterpoof propety	Waterproof(※6)	Drip-proof(IP53)						
	Temperature resistance	0～50℃							
	Sensor(※1)	1/18″	1/36″ color CMOS sensor			1/18″color CMOS sensor		1/36″	1/36″
	Effective pixels	9000(fibers)	400 x 400				720 x 720	400 x 400	
	Dedicated Monitor		HKT-5.6SA II α						
	Output (Interface)	Built-in Interface (USB connection only)	HKT-USB typeX				HKT-USB typeXS	HKT-USB typeX	
			HKT-USB type WS					HKT-USB type WS	
			HKT-DVI type W II				HKT-DVI-720P	HKT-DVI type W II	
	Effective insertion length	1m	Standard：1m	Relay cable：800mm	Standard:1m	Standard:1m MAX:6m		Relay cable：800mm	1m
	Tip hard part length		Standard:45mm MAX:95mm(※5) (Tip φ0.98mm hard part)	Standard:100mm (Tipϕ1.3mm hard part)	standard:100mm MAX:200mm(※3)	20mm		100mm only	
	Remarks		Flexible type (※4)	Pen type	Flexible type (※4)				

※1 There are pixel defects in the CMOS Imaging Sensor. Standards of this products conform to CMOS Imaging sensor maker standards.

※2 This product may tilt the camera module during the manufacturing process.
There is a possibility of deviation by up to 5 ° (It may be 30mm away from the camera tip and 2.6mm off the center.)
Please note that due to its structure, the hard tip may be misaligned.

※3 The tip has a hard part with a diameter of 1.3 mm. Even when extended, the total length is 1 m. Please contact us if you require a length longer than 200 mm.

※4 The hard tip does not bend. ※5 Custom orders available: Minimum 20mm. ※6 Only the fiber part is completely waterproof.

Notice・・・It has sometimes "Stray Light" in Industrial Video Borescope.
Please note that there is no problem with the inspection standards of semiconductor manufacturers.

ϕ2.5mm～ϕ4.6mm Industrial Borescope specification

HNL-4.6CAM90NV

A B C
(When tube option is selected)



		ϕ2.5mm	ϕ2.9mm Ultra Small Industrial Video Borescope				ϕ4.0mm Side View Borescope	ϕ4.6mm Video Borescope	
A		HNL-1.8CAM	HNL-2.9CAM				SDV-4.0CAM	HNL-4.6CAM	
B		120ATT	35N	35F	120K	120KSQ	120T	90N	90F
	Depth of field(mm)	5～50	5～10	10～50	5～50		5～50	5～10	10～50
	Angle of view(※2)	120°	35°		120°		120°	90°	
	Outer diameter(mm)	ϕ2.5	ϕ2.9				ϕ4.0	ϕ4.6	
	Light source	Light Guide※3	LED		Light Guide※3		LED	LED	
	Waterpoof propety	Drip-proof(IP53)							
	Temperature resistance	0～50℃							
	Sensor(※1)	1/18″ color CMOS sensor	1/10″ color CMOS sensor		1/18″ color CMOS sensor		1/18″ color CMOS sensor	1/18″	
	Effective pixels	400 x 400	400 x 400			720 x 720	400 x 400	320 x 240	
	Output (Interface)	HKT-5.6SA II α							
		HKT-USB typeX	HKT-USB type2		HKT-USB typeX	HKT-USB typeXS	HKT-USB typeX		
		HKT-USB type WS			HKT-USB type WS		HKT-USB type WS		
		HKT-DVI typeW II			HKT-DVI typeW II	HKT-DVI-720P	HKT-DVI typeW II		
C	Tube options (Standard: 1m) ※2	Effective insertion length 90mm ※4	Standard tube(Max：20m)		K : Casing tube (1m only)		Rigid pipe (Standard：200mm Max：500mm)	Standard tube（Max：5m）	
			V : SUS Braiding coated (max 20m)				H：Shape retention 200mm only	V : SUS Braiding coated (max 10m)	
			H : Shape retaining tube (max 1m)						

※1 There are pixel defects in the CMOS Imaging Sensor. Standards of this products conform to CMOS Imaging sensor maker standards.

※2 As for tube extension, the extendable length is different for each tube specification. If the length of the tube exceeds 1m(standard), it becomes a special order item.
For details,please contact us.

※3 Fiber Optic Light Guide (with light modulation function).

※4 Custom-made 50mm and 120mm sizes available. Please contact us if you require other lengths.

Notice・・・It has sometimes "Stray Light" in Industrial Video Borescope. Please note that there is no problem with the inspection standards of semiconductor manufacturers.

ϕ4.6mm～ϕ6.0mm Industrial Borescope specification

HNL-6.0HDC140SQH

A　B　C

(When tube option is selected)



		ϕ4.6mm HD Borescope		ϕ5.0mm	ϕ6.0mm FHD Borescope		
		Standard tube	Tubeless specification	HD Borescope	Standard tube	Shape retaining tube	Tubeless specification
A		HNL-4.6HDC		HNL-4.6HDC	HNL-6.0HDC		
B		110SQ		110SQST	140SQ		
	Depth of field(mm)	10～100mm		10～100mm	10～100mm		
	Angle of view(※2)	110°		110°	140°		
	Outer diameter(mm)	Φ4.6mm		Φ5.0mm	Φ6.0mm		
	Light source	LED		LED	LED		
	Waterpoof propety	Drip-proof(IP53)		Drip-proof(IP53)	Drip-proof(IP53)		
	Temperature resistance	0～50℃		0～50℃	0～50℃		
	Sensor(※1)	1/11" color CMOS sensor		1/11" color CMOS sensor	1/6" color CMOS sensor		
	Effective pixels	1280×720		1280×720	1920 x 1080		
	Output (Interface)	HKT-DVI (for HNL-4.6HDC)		HKT-DVI (for HNL-4.6HDC)	HKT-DVI (for HNL-6.0HDC)		
	Effective insertion length	standard：1m Max：5m ※2		standard：1m Max：5m※2	standard：1m Max：5m	standard：1m (1m only)	standard：1m Max：5m
C	Tube options	Standard tube (PE & SUS)	TL : Tubeless specification	standard:185mm※3 (MAX：500mm) (Hard tip ϕ5mm)	Standard tube (PE & SUS)	H : Shape retaining tube	TL:Tubeless specification

※1　There are pixel defects in the CMOS Imaging Sensor. Standards of this products conform to CMOS Imaging sensor maker standards.

※2　Please note that for lengths of 2m or more, only USB output is available.　※3　If you require a specific length please contact us.

Note: Due to variations in the lens, stray light may occasionally occur.

Dedicated Monitor specification

	5.6 inch TFT monitor
Model number	HKT-5.6SA II α
Screen size	112 × 84mm
Effective resolution	640 × 3 (RGB) × 480
Input (camera)	HNL-0.98CAM120SQ　HNL-1.8CAM120SQ　HNL-2.9CAM120KSQ HNL-1.3CAM120(S)　HNL-1.8CAM120ATT　SDV-4.0CAM120T(H) HNL-1.8CAM120　HNL-2.9 Series　HNL-4.6CAM Series HNL-1.8CAM120ST　HNL-2.9CAM120K
Output	SD card
Storage format	JPEG
Power	AC adapter (6V,1.8A)
Power (dry cell)	4 size C batteries (3 hours in continued use)※2
Unit dimension	138×134×52mm
Weight (※1)	800g

※1　Weight when the battery is removed.

※2　We recommend rechargeable batteries or EVOLTA as the recommended batteries.
The continuous use time shown in the table is the time when using EVOLTA.
EVOLTA is a registered trademark of Panasonic Corporation

High-definition Interface specifications

	USB/DVI Interface for HD Borescopes	
Model number	HKT-DVI (for HNL-4.6HDC)	HKT-DVI (for HNL-6.0HDC)
Input (camera)	HNL-4.6HDC Series	HNL-6.0HDC Series
Output Interface	①USB output (USB2.0, UVC1.1) ②DVI output　※Alternate output	
Output pixels	1280×720	1920×1080
Output frame rate	60fps ※1	30 fps
Power	At USB output: USB bus power At DVI output: DC6V (AC adapter)	
Compatible PC (program)	Windows 11 recommended　"AMCap"(Viewer software) "camera" app. (in windows 11)※1	
Compatible monitors	HDMI input 720P (60Hz), 1080P (30Hz) Compatible TV or monitor	

※1　If the camera length of the HNL-4.6HDC exceeds 2m, the frame rate will be 30FPS.

Interface specifications

	USB Interface				DVI Interface		
Model number	HKT-USB Type X	HKT-USB Type WS	HKT-USB Type 2	HKT-USB Type XS	HKT-DVI Type W II	HKT-DVI-720P	HKT-DVI-480P
Input (camera)	HNL-0.98CAM120SQ HNL-1.3CAM120(S) HNL-1.8CAM120 HNL-1.8CAM120ST	HNL-1.8CAM120STT HNL-2.3CAM120K HNL-2.9CAM120K SDV-4.0CAM120T(H)	HNL-2.9 Series	HNL-1.8CAM120SQ HNL-2.9CAM120KSQ	HKT-USB TYPE X HKT-USB TYPE WS Compatible cameras listed above	HNL-1.8CAM120SQ HNL-2.9CAM120KSQ	HNL-2.9CAM Series
Output (Interface)	USB2.0				DVI output		
Output pixels	400×400	800×800 equivalent	400×400	720×720	800×720 equivalent	720×720	400×400
Output frame rate	30 fps				60 fps	60 fps	60 fps
Power	USB bus power				DC6V (AC adapter)		
Compatible PC (program)	Windows 11 recommended (AMCap、Camera) ※1						
Compatible monitors					HDMI input 720P(60Hz) Compatible TV or monitor		HDMI input 480P(60Hz) Compatible TV or monitor

※1　The recommended application program is AMCap.
However, in the case of Windows 11, it works with the built-in Windows camera app. (Still images and videos can be saved.)

SPI ENGINEERING

— Simple, Precision and Innovation —

CAUTION

When Video Borescope LED at the tip is used continuously at 40℃ or higher,
The LED lifetime may be extremely reduced.

About electrostatic breakdown voltage
The CMOS sensor at the tip of the borescope camera is extremely sensitive to static electricity (static electricity withstand voltage 2kV)
When handling this product, it may be necessary to take measures against static electricity, such as static electricity removal by workers and static electricity removal in work spaces.
Please contact us for details.

About product dimensions (tolerance)
Actual product dimensions and catalog values may be slightly different.
Please contact us for details.

Warranty period
1 year warranty for monitor and interface.(Excludes those due to the user's responsibility)
Borescope camera is not guaranteed.（Excluding initial failure）

The specifications and appearance may change without notice.

These products are for industrial use. Please do not use these for medical.

Manufactured and Distributed by

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